IN THE CLAIMS

The following claim set replaces all prior versions, and listings, of claims in the application:

1. (Currently Amended) A method for controlling blood flow through an extracorporeal ~~blood~~ circuit coupled to a blood pump comprising ~~the steps of~~:

a. continuously withdrawing the blood from a withdrawal blood vessel in a patient into the extracorporeal circuit, processing the blood in the circuit, and infusing the processed blood into the patient in a continuous manner;

b. detecting an occlusion which at least partially blocks the withdrawal of blood from the patient;~~, and~~

c. interrupting the continuous step (a), and automatically and temporarily ~~reversing a flow~~ ceasing the withdrawal of the blood to ~~infuse blood from the circuit into the withdrawal blood vessel~~ after step (b), and

d. resuming step (a) automatically after step (c) to resume withdrawal of the blood.

2. (Original) A method for controlling blood flow as in claim 1 wherein the occlusion is detected based on a pressure measurement of the blood in the circuit.

3. (Cancelled)

4. (Currently Amended) A method for controlling blood flow as in claim 1 wherein blood flow is ~~reversed~~ ceased after the blood flow is ~~substantially~~ gradually reduced during step (a).

5. (Currently Amended) A method for controlling blood flow as in claim 1 wherein blood flow is ~~reversed~~ ceased after the blood flow is ~~substantially~~ gradually reduced ~~to zero flow~~ during step (a).

6. (Currently Amended) A method for controlling blood flow as in claim 1 wherein blood flow is ~~reversed~~ ceased after the withdrawal blood vessel collapses.

7. (Currently Amended) A method for controlling blood flow as in claim 1 wherein the flow is temporarily ~~reversed~~ ceased after an occlusion has been detected in the withdrawal blood vessel and later automatically reversed before resuming step (a).

8. (Currently Amended) A method for controlling blood flow as in claim 1 wherein the blood flow is ~~reversed~~ automatically ceased for a predetermined duration and later automatically restarted by performing step (a).

9.(Currently Amended) A method for controlling blood flow as in claim 1 wherein the ~~reversed~~ blood flow is automatically ceased for a predetermined duration and later automatically restarted by performing step (a) based upon blood flow being measured less than a specified predetermined limit.~~has a predetermined flow rate~~.

10. (Currently Amended) A method for controlling blood flow as in claim ~~9~~ 1 wherein the flow rate is substantially ~~less than the flow rate~~reduced during step (a) and prior to the detection of the occlusion in step (b).

11. (Original) A method for controlling blood flow as in claim 1 wherein the step (a) is repeated after step (c) when a flow capacity of the withdrawal blood vessel substantially increases.

12. (Currently Amended) A method for controlling blood flow as in claim 1 further comprising ~~a step of~~ gradually reducing blood flow prior to step (b).

13. (Currently Amended) A method of controlling an extracorporeal ~~blood~~ circuit having a blood pump, said method comprising ~~the steps of~~:

a. withdrawing blood from a withdrawal blood vessel in a patient into the extracorporeal circuit, filtering the blood in a blood filter and continually infusing the filtered blood into the patient;

b. determining a withdrawal blood pressure in the extracorporeal circuit;

c. withdrawing blood at a flow rate based on an algorithm executed by the blood pump that correlates the flow rate to the withdrawal blood pressure; ~~selected to reduce a difference between the withdrawal pressure and an occlusion limit which is a function of blood flow through the circuit and withdrawal pressure, and~~

d. interrupting step (a) to temporarily ~~reversing~~ stop the blood pump and cease blood flow to infuse blood from the circuit into the withdrawal blood vessel if the flow rate ~~selected~~ determined in step (c~~b~~) is reduced to below a predetermined limit, and

e. automatically resuming step (a) after step (d).~~;~~

14. (Original) A method of controlling an extracorporeal blood circuit as in claim 13 wherein the predetermined limit is a blood flow rate of substantially zero.

15. (Currently Amended) A method of controlling an extracorporeal blood circuit as in claim 13 further comprising ~~the steps of~~:

e. detecting an occlusion which at least partially blocks the withdrawal of blood from the patient, and

f. temporarily ~~reversing~~ ceasing a flow of the blood to infuse blood from the circuit into ~~the withdrawal~~an infusion blood vessel and temporarily ceasing the withdraw blood from the withdrawal vessel if ~~the step (b) of~~ a pump controller executing the algorithm is unsuccessful in maintaining significant blood flow.

16. (Currently Amended) A method for controlling withdrawal of blood from a patient into an extracorporeal circuit which continuously withdraws blood from a patient,

processes the blood and infuses the processed blood into the patient, and allowing for detection of and recovery from a reduced flow capacity or total occlusion of a withdrawal blood vessel, comprising ~~the steps of~~:

a. reducing blood flow being withdrawn from the patient when a withdrawal pressure of the blood in the circuit becomes more negative than an occlusion limit that is a function of blood flow through the circuit, and

b. if the reduced blood flow is reduced below a predetermined minimal flow during step (a), then interrupting the continuous withdrawal, processing and infusion of blood, and automatically and temporarily ~~reversing~~ ceasing the flow of blood in the circuit ~~and infusing blood into the withdrawal blood vessel~~.

17. (Currently Amended) A method as in claim 16 further comprising ~~the steps of~~:

c. prior to step (a), increasing a rate of blood being withdrawn until the withdrawal blood vessel begins to collapse and occlude blood withdrawal;

d. prior to step (a), determining an occlusion withdrawal pressure corresponding to collapse of the vessel,

e. initiating step (b) when the collapse withdrawal pressure is detected.

18. (Original) A method as in the claim 17 wherein the collapse withdrawal pressure is a variable and a function of withdrawal blood flow.

19. (Original) A method as in claim 17 wherein the collapse withdrawal pressure is periodically reestablished by stopping the blood flow through the circuit pump and then performing steps (c), (d) and (e).

20. (Currently Amended) A system for controlling blood flow withdrawn from a patient comprising:

an extracorporeal circuit having a blood passage including a blood withdrawal tube, a treatment device and an infusion tube,

a pressure sensor coupled to said withdrawal tube and sensing a blood pressure in the withdrawal tube;

a pump coupled to the circuit and adapted to move blood through the blood passage at a controlled flow rate, and

a pump controller receiving a blood pressure signal from the pressure sensor and controlling the pump to regulate the controlled flow rate, wherein the pump controller includes a processor and a memory storing a control algorithm of a variable withdrawal pressure target as a function of flow rate, said controller reduces the controlled flow rate based on a difference between a withdrawal pressure sensed by the pressure sensor and the withdrawal pressure target, ~~and~~ wherein said controller ~~reverses~~ temporarily ceases blood flow ~~to infuse blood into the patient~~ through the withdrawal tube if the controlled flow rate is reduced below a predetermined limit ~~-~~and said controller later automatically restarts blood flow through the withdrawal.

21. (Original) A system as in claim 20 wherein the pump controller includes a proportional integral feed forward pressure controller.

22. (Original) A system as in claim 20 wherein the treatment device is a hemofilter.

23. (Original) A system as in claim 20 wherein the treatment device is a dialysis device.

24. (Original) A system as in claim 20 wherein the pressure sensor is a real time sensor providing real time pressure signals to the pump controller.

25. (Original) A system as in claim 20 wherein the pump includes a direct DC drive motor.

26. (Original) A system as in claim 25 wherein the drive motor is a brushless motor.

27. (Original) A system as in claim 20 wherein the treatment device is a blood filter.

28. (Original) A system as in claim 20 wherein the pressure controller alternatively controls a withdrawal pressure and an infusion pressure by synchronized switching.

29. through 36. (Cancelled).